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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,834	12/08/2003	Kia Silverbrook	MTB04US	9265

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SILVERBROOK RESEARCH PTY LTD
393 DARLING STREET
BALMAIN, 2041
AUSTRALIA

EXAMINER

STEPHENS, JUANITA DIONNE

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/728,834	Applicant(s) SILVERBROOK, KIA	
	Examiner Juanita D. Stephens	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on CIP filed 12/08/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 and 28-54 is/are rejected.
- 7) ☒ Claim(s) 8 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12/16/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because on line 11 delete "Fig. 4". Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:

On page 1, line 1 the cross-reference to related art should be placed after the Title. See MPEP 608.01(a). Also in the cross-reference to related art after "10/302,274" insert --now US Patent No. 6,755,509--, and after "November 23, 2002" insert --.--.

Appropriate correction is required.

Claim Objections

3. Claims 8, 9, 11, 17, 27, 28, 30, and 36 are objected to because of the following informalities:

Claims 8 and 27 recite "wherein each of the nozzles defines an ejection aperture positioned less than 50 microns from the ejection aperture". How can the ejection aperture be distanced from itself. In claim 27 it is unclear as to what structure the ejection aperture is distanced from. (i.e., the heater?)

In claim 9, line 4 delete "the" (second occurrence).

In claim 11, line 2 delete "a".

In claim 17, line 4 delete "a" (second occurrence).

In claim 28, line 5 delete "the" (second occurrence).

In claim 30, line 2 delete "a".

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In claim 36, line 4 delete "a" (second occurrence).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7, 9, 11-12, 17-26, 28, 30-31, 36-45, 47-48, and 53-54

35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Yamashita et al. (US 5,969,005).

Kubby discloses a method of ejecting drops of an ejectable liquid from a printhead, an ink jet printhead and a printer system which incorporates a printhead, comprising: 1) a plurality of nozzles; 2) at least one heater element (20a) corresponding to each of the nozzles respectively, the heater element configured for thermal contact with a bubble forming liquid, 3) heating the heater element to a temperature above the boiling point of the bubble forming liquid to form a gas bubble that causes the ejection of a drop of an ejectable liquid through the nozzle corresponding to that heater element, 4) wherein the bubble forming liquid and the ejectable liquid are of a common body (as seen in Fig. 5), 5) print on a page and to be a page width printhead (col 1, Ins 13-16, Ins 45-48), 6) wherein each heater element (20a) is in the form of a cantilever beam (18) (col 4, Ins 46-55), 7) configured to receive a supply of the ejectable liquid at an

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ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said ejectable liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point (col 5, lns 12-26), 8) wherein each heater element (20a) has two opposite sides and is configured such that said bubble formed by that heater element is formed at both said sides of that heater element (col 4, lns 59-63), 9) the bubble expands until it reaches a maximum size, at which point it begins to collapse, wherein the point of collapse is spaced apart from the heater, and 10) wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied substantially to all sides of the heater element simultaneously such that the coating is seamless (col 4, lns 11-17, Fig. 4).

Kubby does not disclose 1) the gas bubble displaces less than 4 nanograms of the ejectable liquid to cause the ejection of the drop, 2) the gas bubble displaces less than 3 nanograms of the ejectable liquid to cause the ejection of the drop, 3) the gas bubble displaces less than 2 nanograms of the ejectable liquid to cause the ejection of the drop, 4) the gas bubble displaces less than 1.5 nanograms of the ejectable liquid to cause the ejection of the drop, and 5) wherein gas bubble displaces less than 10 nanograms of the ejectable liquid to cause the ejection of the drop. Yamashita et al. at least teaches that the ink is jetted at an output of from 1 to 70 nanograms per droplet to effect recording (abstract, col 30, lns 29-32, lns 38-40; col 31, lns 18-22). It would have been

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obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby with the output of 1 to 70 nanograms per droplet to effect recording as taught to be old by Yamashita et al. for the purpose of providing a greater surface area of the droplet, thus strongly improving image quality.

The method of claims 38-45, 47-48, and 53-54 are disclosed in Kubby in view of Yamashita et al. as discussed above with respect to the apparatus.

6. Claims 10, 29, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby in view of Yamashita et al. as applied to claims 1-7, 9, 11-12, 17-26, 28, 30-31, 36-45, 47-48, and 53-54 above, and further in view of Feinn et al. (US 6,543,879 B1)

Kubby in view of Yamashita et al. teaches the claimed invention, with the exception of the nozzle density exceeds 10,000 nozzles per square cm. Feinn et al. at least teaches an ink jet print head having a nozzle density of at least 10,000 nozzles per square cm (Abstract). It would have been further obvious at the time the invention was made to a person having ordinary skill in the ink jet art to have provided Kubby in view of Yamashita et al with a nozzle density of at least 10,000 nozzles per square cm as taught to be old by Feinn et al. for the purpose of improving resolution.

The method of claim 46 is disclosed in Kubby in view of Yamashita et al. and further in view of Feinn et al. as discussed above with respect to the apparatus.

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7. Claims 13-14, 32-33, and 49-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby in view of Yamashita as applied to claims 1-7, 9, 11-12, 17-26, 28, 30-31, 36-45, 47-48, and 53-54 above, and further in view of Silverbrook (US 6,019,457).

Kubby in view of Yamashita et al. teaches the claimed invention, with the exception of a structure that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure, and a structure, which is less than 10 microns thick, the nozzles being incorporated on the structure. Silverbrook at least teaches a structure (overcoat 142) that is formed by chemical vapor deposition (CVD), the nozzles being incorporated on the structure, and a structure, which is less than 10 microns thick, the nozzles being incorporated on the structure (col 8, lns 65-66; col 9, lns 8-10). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby in view of Yamashita by providing a structure that is formed by chemical vapor deposition (CVD), wherein the structure is less than 10 microns thick, the nozzles being incorporated on the structure as taught to be old by Silverbrook for the purpose of providing nozzles, providing mechanical strength to resist the shock, of exploding or collapsing vapor bubbles and providing protection against the external environment.

The method of claims 49-50 are disclosed in Kubby in view of Yamashita et al. and further in view of Silverbrook as discussed above with respect to the apparatus.

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8. Claims 15, 34, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby in view of Yamashita et al. as applied to claims 1-7, 9, 11-12, 17-26, 28, 30-31, 36-45, 47-48, and 53-54 above, and further in view of Komuro (US 4,965,594)

Kubby in view of Yamashita et al. teaches the claimed invention, with the exception of the heater being formed on different layers. Komuro at least teaches an inkjet print head having a heater that is formed in a plurality of different layers (col 3, lns 35-65, as seen in Fig. 1). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby in view of Yamashita by providing a heater that is formed in a plurality of different layers as taught to be old by Komuro for the purpose of enabling drops of different sizes to be ejected in order to produce a gradated recording.

The method of claim 51 is disclosed in Kubby in view of Yamashita et al. and further in view of Komuro as discussed above with respect to the apparatus.

9. Claims 16, 35, and 52 rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby in view of Yamashita et al. as applied to claims 1-7, 9, 11-12, 17-26, 28, 30-31, 36-45, 47-48, and 53-54 above, and further in view of The Fabrication and Reliability Testing of Ti/TiN Heaters (DeMoor).

Kubby in view of Yamashita et al. teaches the claimed invention, with the exception of a heater having more than 90% of an element having an atomic number below 50. DeMoor at least teaches that it is desirable to use a heater

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made of Ti/TiN in integrated MEMS systems (a thermal inkjet is such a system), because this material provides the advantages of CMOS fabrication (low cost and uniformity) in combination with a very high reliability (see conclusion). Ti has an atomic number of 22. It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to provide Kubby in view of Yamashita et al. with a Ti/TiN heater as taught to be old by DeMoor, for the purpose of providing the advantages of CMOS fabrication (low cost and uniformity) in combination with a very high reliability.

The method of claim 52 is disclosed in Kubby in view of Yamashita et al. and further in view of DeMoor as discussed above with respect to the apparatus.

Comments

10. **Claims 8 and 27 are unclear, therefore they have not been treated on the merits as of yet.**

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Juanita D. Stephens". The signature is fluid and cursive, with the first name "Juanita" being more prominent.

Juanita D. Stephens
Primary Examiner
Art Unit 2853

March 2, 2005